



the issues

biodiversity

Short for biological diversity, biodiversity is the variety of all life in a given area – this area could be as small as your backyard, or as large as the entire planet.ⁱ Biodiversity includes not only the variety of species of plants and animals (species diversity), but also the variety of genes contained in all individual organisms (genetic diversity), and the variety of habitats, biological communities, and ecological processes (ecosystem diversity).ⁱⁱ

Biodiversity is essential for our existence because the earth's biological systems and processes provide us with food, materials for clothing and shelter, fuel, medicine, clean water, and clean air. Biodiversity also provides all other species with the resources required for their survival. In fact, given the interdependence of the Earth's living organisms, ecosystems, and biological processes, without biodiversity, life on Earth would become extinct.

Species and Breeds

A species is a scientific classification used to group together plants or animals that have similar characteristics. Within the various domesticated animal species, there are many different subgroups called breeds. A breed is simply a specific variety of a particular domesticated animal species; while all breeds within the same species share common characteristics, each breed has certain unique traits.

Unfortunately, the Earth is currently experiencing a rapid loss of biodiversity. Human-induced environmental destruction has eliminated habitats, killed living organisms, reduced genetic diversity, and caused the rate of species extinction to increase dramatically. In fact, unsustainable human activity is now the greatest threat to biodiversity.

Biodiversity and Agriculture

Humans are directly dependent upon a variety of plants and animals that provide our supply of food. Furthermore, the production of these foodstuffs involves a variety of ecological processes and the activities of many different living organisms. Without biodiversity, none of our food could be produced.

Here are a few essential agricultural processes made possible by Earth's biodiversity:

Pest Control

Natural predators such as wasps and birds help reduce populations of pests that destroy plants on farms.

Pollination

Many of the world's staple crops are pollinated by insects, birds, bats and other animals.

Productive Soil

A variety of living organisms take part in the decomposition processes that create soils and make nutrients available for plants to use.

Resistance to Disease and Pests

Genetic diversity helps to provide resistance to disease and pests – mass production of a single crop variety makes it easier for a disease or pest to wipe-out the entire crop.

Unfortunately, industrial agriculture has caused a dramatic reduction of genetic diversity within the animal and plant species typically used for food. About 7,000 different species of plants have been raised as food crops in the history of human agriculture. Yet in part because of modern tendencies towards mass production, only fifteen plant and eight animal species are now relied

upon for about 90% of all human food.ⁱⁱⁱ As a result of this homogenization of the food industry, thousands of non-commercial animal breeds and crop varieties have disappeared, along with the valuable genetic diversity they possessed.

The Plight of the Industrial Turkey^{vii}

99% of all turkeys raised in the U.S. are Broad-Breasted Whites, a single turkey breed specially developed to have a meaty breast. The breasts of these turkeys are so large that they are unable to reproduce naturally; according to the FAO, without artificial insemination performed by humans, this breed would become extinct in just one generation.

[Read more about heritage turkeys...](#)

Farm Animals

Centuries of natural and human selection have created thousands of breeds within each of the major domesticated animal species. Since each breed has slightly different genetic traits, different breeds are better suited for different environmental conditions. For instance, certain breeds are adapted to withstand extreme heat; others are adapted to withstand extreme cold, others are especially resistant to disease, while others are adapted to survive periods of drought, etc.

While none of the major species of domesticated livestock or poultry are in danger of extinction, other livestock breeds are disappearing rapidly. According to the United Nations Food and Agriculture Organization (FAO), we are currently losing an average of 2 domestic animal breeds each week,^{iv} and half of all domestic animal breeds that existed in Europe in 1900 are now extinct.^v In the past fifteen years alone, the FAO has identified the extinction of 300 out of 6000 breeds worldwide, with another 1,350 in danger of extinction.^{vi}

The decline in livestock diversity has resulted largely from the rise of industrial agriculture. Factory farms mass-produce only a few select livestock breeds that have been specially chosen to maximize production of meat, milk, or eggs. Since industrial agriculture's domination of the meat and dairy industries continues to force independent farmers out of business, the [heritage](#) livestock breeds raised by these farmers are quickly disappearing. This has caused a sharp decrease in the genetic diversity of the world's livestock populations.

Endangered Livestock Breeds^x

Following are a few examples of non-commercial animal breeds currently in danger of extinction:

Taihu pig - These Chinese pigs are able to eat a high proportion of forage food and produce litters of up to 16 piglets (compared to 10 piglets for most Western breeds).

Fayoumi chicken - These Egyptian chickens can withstand high temperatures and are resistant to many poultry diseases.

N'Dama cattle - While less productive than modern industrial breeds, these cattle are resistant to a fatal disease transmitted by the tsetse fly.

Reggiana cattle - These rare Italian cattle are renowned for their milk, which is used to produce exceptional Parmesan cheese.

Yakut cattle - Native to Northern Siberia, these cattle are able to withstand extreme temperature changes.

Gulf Coast Native sheep - This breed is resistant to parasites and well-adapted to high heat and humidity.

American Mammoth Jackstock - Native to North America, this ass breed is known for its fertility, regularly producing many mules.

The loss of genetic diversity in livestock poses several significant problems. First, industrial production has created a system in which livestock breeds are no longer suited to local environmental conditions. Instead, industrial livestock breeds have been bred to live in a carefully-regulated environment. In order to survive, these animals require costly inputs such as climate-controlled housing, regular doses of antibiotics, and large quantities of high-protein feed.^{viii} Unlike hearty, traditional breeds which are adapted to withstand harsh environmental conditions, industrial livestock breeds are often unable to survive outside of the factory farm.

It is crucial that diverse livestock breeds be preserved, as they serve as an important genetic resource. When a breed goes extinct, its unique genes are lost forever and can't be used to give new traits to existing livestock breeds. Unlike industrial farms that promote a few, limited breeds and a narrow gene pool, sustainable farms help to preserve valuable traits within livestock breeds so that future breeds can endure harsh conditions and survive outbreaks of disease.^{ix}

Crops

Industrial farms currently mass-produce only a few genetic varieties of each crop used for food. These commercial crop varieties are specially bred for uniform appearance, disease-resistance, and for their ability to endure lengthy transport. Unfortunately, when farmers abandon traditional varieties to begin planting mass-produced commercial varieties, the traditional varieties can quickly become extinct.

Each plant variety contains unique genetic information that tells it how to grow. While all the varieties of a given species have many similar traits, each variety has a different genetic composition and therefore slightly different characteristics. The genetic composition of a fruit or vegetable variety not only influences its appearance and flavor, but also affects characteristics such as the plant's ability to withstand extreme temperatures and resist pests and diseases.

When non-commercial plant varieties become extinct, we not only lose the distinctive flavors and appearances of these fruits, vegetables and grains, we also lose the genetic diversity that they otherwise contribute to the plant stock. According to the Food and Agriculture Organization of the United Nations, since 1900, approximately 75% of the world's genetic diversity of agricultural crops has been eliminated.^{xiii}

As the number of crop varieties decrease (reducing the genetic diversity of these plant species), existing crops become increasingly susceptible to devastation by disease and pests. If crops are all the same, it's much easier for a new disease or pest to wipe-out an entire harvest. Indeed, the lack of genetic diversity has contributed to widespread crop-loss in the past – for example:

In 1970, US farmers lost \$1 billion worth of crops after a disease killed uniform corn varieties.^{xiv}

Lack of genetic diversity led to massive outbreaks of citrus canker in Florida in 1984 and in Brazil in 1991.^{xv}

During the 1840's, the majority of the population of Ireland relied upon a single variety of the potato. As a result of the lack of genetic diversity, a fungus was able to destroy the entire potato crop, causing the infamous Irish Potato Famine.^{xvi}

The Seed Problem

The seed industry has become another main contributor to the disappearance of traditional plant varieties. A few huge companies now produce much of the seed

used by farmers. For example, in 1998, the 10 largest seed companies controlled about 33% of the global seed market,^{xi} and today 69% of all corn and 47% of all soybean seeds in the US were purchased from just four major companies.^{xii} These seed companies typically sell only industrial varieties of plant seeds, and because they dominate national and international seed markets, it is increasingly difficult for farmers to buy non-industrial seed varieties.

The rapid reduction of genetic diversity also makes it more difficult for plant breeders to develop new crop varieties. In order to protect plants from newly emerging diseases and pests, commercial plant breeders use traditional, non-industrial plant varieties to breed resistance into the existing commercial crop varieties. However, the rapid disappearance of non-industrial plant varieties is quickly eliminating this source of genetic material, thus compromising our ability to adapt crops to suit changing conditions. This jeopardizes the future security of our food supply.

Environmental Damage

Industrial agriculture also reduces biodiversity by damaging the natural environment through pollution from untreated animal waste, chemicals and soil erosion. Excessive amounts of manure created by the thousands of animals found on large industrial farms create air, groundwater and surface water pollution. In addition, industrial agriculture uses enormous amounts of pesticides and chemical fertilizers that leach into the ground and water, polluting the surrounding environment.

Factory farms generate tremendous amounts of pollution. While concentrated animal feeding operations (CAFOs) contaminate [soil](#), [water](#) and [air](#) with vast quantities of untreated manure, industrial crop producers pollute the environment with enormous amounts of chemical pesticides and fertilizers. These pollutants kill living organisms and destroy the natural environment.

Since the loss of genetic diversity makes plants increasingly vulnerable to devastation by pests, industrial farms compensate by using increased amounts of chemical [pesticides](#). Unfortunately, these substances cause significant damage to local and regional ecosystems. Extensive pesticide use is particularly harmful to insect populations, including those that are important to the environment. The US honeybee population—responsible for pollinating an estimated 15-30% of all food consumed in the United States—has been reduced by about half in the past fifty years by the toxic chemicals present in pesticides.^{xvii}

Pollution caused by excessive use of chemical fertilizers and over-application of [manure](#) degrades waterways and kills aquatic organisms by depleting the oxygen content of the water. Heavy use of nitrogen fertilizers on industrial farms can also reduce biodiversity because only certain plants will grow well in nitrogen-rich environments, and these plants will crowd out other species.^{xx}

Excessive use of chemical fertilizers and over-application of manure have contributed to the creation of an oxygen-depleted “dead zone,” an area in the Gulf of Mexico where no aquatic life can survive. According to the USDA, “as much as 15 percent of the nitrogen fertilizer applied to cropland in the Mississippi River Basin makes its way to the Gulf of Mexico.”^{xviii} This contributes to the Gulf “dead zone” which, depending on the time of year, can be as large as 8,000 square miles—almost the size of New Jersey.^{xix}

What You Can Do

A growing number of sustainable farmers are preserving agricultural variety and protecting biodiversity by raising [“heritage”](#) and [“heirloom”](#) animal breeds, fruits, and vegetables. As responsible stewards of the land, sustainable farmers raise only as many animals as the land is capable of handling, and avoid using harmful pesticides and chemical fertilizers.

By supporting these farmers, you can help promote biodiversity and protect valuable breeds of

animals and plants from facing extinction.

Visit the [Eat Well Guide](#) to find a farm, market or restaurant near you that sells meat, eggs and dairy products from heritage animals, and visit a local [farmers market](#) to find heirloom fruits and vegetables. Also, buy [organic](#) foods – these foods were not grown with chemical fertilizers or the pesticides that deplete biodiversity.

Did You Know?

Almost 96% of the commercial vegetable varieties available in 1903 are now extinct.^{xxi}

According to the Food and Agriculture Organization of the United Nations (FAO), humans now rely upon just 14 species of mammals and birds to supply 90% of all animal-derived foods.^{xxii}

Twelve plant crops account for more than three-quarters of the food consumed in the world, and just three—rice, wheat, and maize—are relied on for more than half of the world's food.^{xxiii}

Reliance upon modern varieties of rice has caused more than 1,500 local rice varieties in Indonesia to become extinct.^{xxiv}